UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/903,300	07/11/2001	Jeffrey D. Harper	033257/207653	9981

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EXAMINER
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ART UNIT	PAPER NUMBER
2622	

DATE MAILED: 06/15/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

PTO-90C (Rev. 10/03)

	Application No.	Applicant(s)
Office Action Summary	09/903,300	HARPER ET AL.
	Examiner	Art Unit	
	Nhan T. Tran	2622	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1) ☒ Responsive to communication(s) filed on *31 March 2006*.

2a) ☐ This action is **FINAL**.   2b) ☒ This action is non-final.

3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4) ☒ Claim(s) *1-3,7,9,10,14,16-19,29-35,37-39,41-47 and 49-53* is/are pending in the application.

     4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5) ☐ Claim(s) _____ is/are allowed.

6) ☒ Claim(s) *1-3,7,9,10,14,16-19,29-35,37-39,41-47 and 49-53* is/are rejected.

7) ☐ Claim(s) _____ is/are objected to.

8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9) ☒ The specification is objected to by the Examiner.

10) ☒ The drawing(s) filed on *11 July 2001* is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.

     Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

     Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

     a) ☐ All   b) ☐ Some * c) ☐ None of:

         1. ☐ Certified copies of the priority documents have been received.

         2. ☐ Certified copies of the priority documents have been received in Application No. _____.

         3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

     * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
     Paper No(s)/Mail Date _____.

4) ☐ Interview Summary (PTO-413)
     Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application (PTO-152)

6) ☐ Other: _____.

DETAILED ACTION

Response to Arguments

1.   Applicant's arguments with respect to claims 1-3, 7, 9, 10, 14, 16-19, 29-35, 37-

39, 41-47, 49-53 have been considered but are moot in view of the new ground(s) of

rejection.

The following art rejection(s) are applied according to broadest reasonable

interpretation of the claimed limitations. Specifically, "a multi-tasking operating system",

"a low priority task/[thread]", "a high priority task/[thread]", "a low priority software-

exclusive module" and "a high priority software-exclusive module" are given their

broadest reasonable interpretation.

Specification

2.   The abstract of the disclosure is objected to because of recitation of "a **mult-**

tasking single CPU environment" which should be changed to -- a multi-tasking single

CPU environment --. Correction is required. See MPEP § 608.01(b).

Drawings

3.   New corrected drawings in compliance with 37 CFR 1.121(d) are required in this

application because lines and characters are not uniform. Applicant is advised to

employ the services of a competent patent draftsperson outside the Office, as the U.S.

Patent and Trademark Office no longer prepares new drawings. The corrected drawings

are required in reply to the Office action to avoid abandonment of the application. The

requirement for corrected drawings will not be held in abeyance.

Claim Objections

4.   Claim 37 is objected to because of the recitation of "the device" in line 2 of claim

37, which should be changed to — the portable barcode reader -- to provide proper

antecedent basis.   Appropriate correction is required.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that

form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless —

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

5.   Claims 1-3, 7, 10, 18, 19, 29, 31-35, 49-53 are rejected under 35 U.S.C. 102(b)

as being anticipated by Chu et al. (US 5,702,059).

Regarding claim 1, Chu discloses an imaging device for capturing optical image

data (Figs. 2 & 10), the device comprising:

an imager (40) for generating an image signal (Fig. 2; col. 7, line 41 – col. 8, line

22);

a memory (memory 19 and/or inherent buffer in circuitry 18) component that

receives the image signal from the imager and stores the image signal as image data

(Fig. 2; col. 8, lines 41-54);

a processor (microprocessor 16 and/or the whole circuitry shown in Fig. 2)

operating according to a multi-tasking operating system (see Figs. 2 & 5; col. 7, lines

20-30; col. 9, lines 9-64 and col.13, line 22 – col. 14, line 4, wherein the processor is

operating to perform **multiple tasks** such as gain, exposure, histogram and decoding

processes, thus the operating system is a multi-tasking operating system);

a histogram processing module (module at step 208) executed by the multi-

tasking operating system as a low priority task that analyzes the image data in the

memory component and calculates a target contrast (see Fig. 5; col. 7, lines 22-31; col.

9, line 21 – col. 10, line 24 and col. 13, line 22 – col. 14, line 4, wherein revised

exposure and gain values represent a target contrast which is calculated based on

previous exposure/gain values and recent intensity histogram analysis of image data; it

should be noted that the histogram processing module is executed by the processor as

a low priority task to improve the image data in a subsequent process after exposure

and gain values are applied at steps 202-206 as a higher priority task);

an imager control module (module at steps 202-206) executed by the multi-

tasking operating system as a high priority task that sets a gain and exposure for the

imager based on the target contrast calculated by the histogram processing module

(see Fig. 5; col. 5, lines 45-53 and col. 22 – col. 14, line 4, wherein step 206 with

applied exposure and gain values using circuits 48 & 52 including revised values from

histogram analysis via feedback loop is always performed as **a high priority task in each image capture** since before capturing an image, exposure and gain values must be **firstly** set by the imager control module).

Regarding claim 18, see the analysis of claim 1, wherein both high and low priority modules are software-exclusive modules since all modules are implemented with embedded software programs which are executed by the microprocessor 16 (col. 7, lines 22-30 and col. 14, lines 20-24).

Regarding claim 19, this method claim is also met by the analyses of claims 1 & 18, wherein "a multi-dimensional imaging device" is disclosed in Figs. 7-10, col. 1, lines 16-25; the contrast is defined as the product of the exposure and gain setting (combination of exposure and gain values to obtain image contrast). It is also noted that "an end of frame signal" is inherent in Chu's device in order for the device to function properly as disclosed.

Regarding claim 29, see the analyses of claim 19, wherein "a program storage device readable by a processor, tangibly embodying a program of instructions executable by the processor to perform a method for exposure control in a multi-dimensional imaging" is disclosed in Fig. 5; col. 7, lines 22-30 and col. 14, lines 20-24.

Regarding claim 49, see the analyses of claims 1, 18 & 19, wherein "CPU" is the

microprocessor 16. Furthermore, Chu discloses a barcode imaging device (col. 1, lines

16-25); an optics imaging system (Figs. 6 & 7) that captures an image of a two-

dimensional barcode data symbol (a 2D barcode); an imaging sensor (photo sensor

array 42; Fig. 2) in communication with the optics imaging system that receives the

image from the optics imaging system and converts the image to an electrical signal

representative of image data (col. 1, lines 16-25).

Regarding claim 2, it is clear that the imager generates the image signal from

multi-dimensional symbologies (2D barcode symbologies; col. 1, lines 16-25).

Regarding claim 3, Chu also discloses that the multi-tasking operating system is

a real-time operating system and wherein the imager control module is executed as a

real-time thread (see Fig. 5 and col. 13, line 22 – col. 14, line 4, wherein the imager

control module is executed as a real-time thread to apply the exposure and gain

values).

Regarding claims 7 & 10, it is seen from the analysis of claim 1 that the imager

control module is implemented in a high priority thread (for applying exposure and gain

values), and the histogram processing module is implemented in a low priority thread

routine (subsequently, for analyzing histogram data).

Regarding claims 31 & 32, see the analyses of claims 1, 19 & 29, wherein a captured contrast setting in response to an end of frame signal from an imager is generated in the high priority software exclusive module (contrast setting is the combined exposure and gain setting which is generated one frame after the other), and a subsequent exposure and gain setting for the imager is generated in the high priority software-exclusive module in a high priority thread module (revised result of exposure and gain setting is applied to the subsequent frame).

Regarding claims 33-35, see the analyses of claims 1, 19 & 29, wherein a target contrast setting in response the end of frame signal, the captured contrast and stored image data is calculated in a low priority thread module (calculation of contrast setting is calculation of combined exposure and gain values based on intensity histogram data in the low priority thread module).

Regarding claim 50, Chu also discloses that the multi-tasking operating system implemented by the CPU of the barcode imaging device further executes a third software-exclusive module that performs calculation on the image data (see col. 14, lines 20-24 and col. 7, lines 22-30).

Regarding claims 51 & 52, see the analysis of claim 49, wherein the first software-exclusive module is defined as controlling exposure time. It should be noted

that the exposure time is inherently synchronized with timing of the imager in order for the device to function as disclosed.

Regarding claim 53, Chu clearly discloses that the barcode imaging device is a portable barcode reader (see Fig. 10).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

6.   Claims 9, 30, 37-39, 41-47 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chu et al. (US 5,702,059) in view of Danielson et al. (US 5,227,614).

Regarding claim 37, Chu discloses a portable barcode reader comprising all limitations as analyzed in claims 1, 18, 19, 29 and 49 above, wherein a central processing unit (Fig. 2) operating in accordance with a multi-tasking operating system and a plurality of software based imaging modules (i.e., exposure and gain modules) to calculate and adjust settings of the imager based on an analysis of the image signals stored in the memory component wherein modules that adjust setting of the imager (adjusting exposure and gain settings) are given a higher priority than modules that calculate desired settings of the imager (i.e., histogram processing module).

Although Chu discloses a multi-tasking operating system and a plurality of software based imaging modules, Chu does not explicitly disclose that the plurality of software based imaging modules are concurrently executed by the processing unit. However, Danielson teaches a portable bar code reader (Figs. 1 & 4; col. 2, lines 15-16) which has a standardized computer processor provided with a multi-tasking operating system such that a wide range of applications software can be run concurrently without jeopardizing the reliability of the system under extended portable operating conditions (see Danielson, col. 2, lines 3-10).

Therefore, it would have been obvious to one of ordinary skill in the art to combine the teachings of Chu and Danielson to arrive at the Applicant's claimed invention so that a plurality of executed software based imaging modules would be run concurrently by the multi-operating system to increase processing efficiency without jeopardizing the reliability of the system.

Regarding claim 38, see the analyses of claims 1 & 18.

Regarding claim 39, it is also seen from the analyses of claims 1, 18 & 37 that the second software-exclusive module implements computations (for revising values) in response to exposure data (the previous exposure and/or gain data applied to the imager) transmitted from the first software-exclusive module and image data transmitted from the memory component.

Regarding claims 41 & 42, see the analyses of claims 7 and 18.

Regarding claims 44 & 45, see the analyses of claims 10 & 18.

Regarding claim 46, see the analyses of claims 1 & 18.

Regarding claim 43, as seen from the combined teachings of Chu and Danielson in claims 37 & 38, the first software-exclusive module is a high priority module in the multi-tasking operating system that executes multiple software modules concurrently. Thus, the high priority module must have a high interrupt service routine in order for the processing unit of the operating system to perform interruption to gain access for execution of such a high priority exposure and gain control module.

Regarding claim 47, see the analyses of claims 43 & 45.

Regarding claims 9 & 30, see the analysis of claim 43.

7.   Claims 14, 16 & 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chu et al. (US 5,702,059) in view of Feng (US 6,062,475).

Regarding claim 14, Chu does not specifically teach a Direct Memory Access (DMA) controller that receives the image signals from the imager, responds to an image

capture command from the second software-exclusive module and transfers captured

image signals into the memory component.   As taught by Feng, Direct Memory Access

controller (275) is utilized in a bar code reader for transferring captured image signals

into memory (274) in response synchronized and clock signals during capturing an

image. See Feng, Figs. 29A & B; col. 21, lines 23-30.

Therefore, it would have been obvious to one of ordinary skill in the art at the

time the invention was made to modify imaging device in combined Chu to include DMA

controller taught by Feng for transferring the image signals directly into the memory in

response to image capture command without going through the microprocessor so as to

reduce workload on the microprocessor, thereby efficient image processing would be

realized.

Regarding claim 16, as shown in Fig. 29A in Feng, DMA controller is inherently a

programmable logic device that serves as an interface between the imager and the

processor.

Regarding claim 17, see the analyses of claims 14 & 16.

Conclusion

8.   Any inquiry concerning this communication or earlier communications from the

examiner should be directed to Nhan T. Tran whose telephone number is (571) 272-

7371. The examiner can normally be reached on Monday - Thursday, 7:30am - 5:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Ometz can be reached on (571) 272-7593. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

NT.

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SUPERVISORY PATENT EXAMINER